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**Microelectronic Status Analysis
of the HELLFIRE Weapon System**

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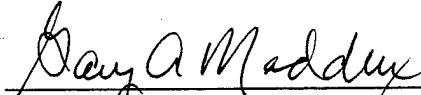
This technical report was prepared by the staff of the Research Institute, The University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 24 of AMCOM Contract No. DAAH01-98-D-R001. Mr. Robert Harvey was the principal investigator. Mr. Steve Pearce, Manufacturing Technology Division, Engineering Directorate, Research, Development, and Engineering Center, U.S. Army Aviation & Missile Command, provided technical coordination.

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Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated January 2000 and the report contains no classified information.



Principal Investigator

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1.0 Introduction

The Manufacturing Technology Division (MT), Engineering Directorate (ED), RDEC, AMCOM has the mission and function of providing microelectronic technology assessments, and producibility and supportability analyses for the HELLFIRE weapon system. MT evaluates the impacts of nonavailability of microelectronic parts on the life cycle supportability of the HELLFIRE weapon system and evaluates the producibility of the HELLFIRE weapon system. MT required engineering support in performing microelectronic technology and availability assessments for several hundred items and in assessing the impact of nonavailability on the HELLFIRE weapon system. MT also required engineering support in performing producibility analyses of the HELLFIRE weapon system.

In order to facilitate the assessment of this system, the Systems Management and Production Laboratory at The University of Alabama in Huntsville Research Institute was tasked to conduct an in-depth analysis as to the life cycle health of the HELLFIRE weapon system's component parts.

2.0 Objective

The purpose of the work performed under this task order was to provide engineering support to analyze the availability of microelectronics used in the HELLFIRE weapon system and to investigate and develop solutions for problem parts. Determination of the producibility of the HELLFIRE weapon system and/or subsystems was required.

3.0 Statement of Work

The statement of work, as outlined in delivery order 24, was as follows:

- 3.1 UAH shall analyze the availability of microelectronic parts used in the HELLFIRE weapon system. The analyses shall be for microelectronics specifically identified by the MT. UAH shall assess the impact of the non-availability of the microelectronics on system supportability. UAH shall evaluate problem resolution approaches. UAH shall identify opportunities for insertion of new electronic technologies to resolve microelectronic availability and obsolescence problems. The analyses shall be performed using government furnished databases and automated tools such as the Enhanced Microcircuit Obsolescence Analysis Tool (E-MOAT) local area network and with the TACTech information service. Other available sources of information shall be used as required. Analyses results shall be recorded in databases, which shall be compatible with current government databases and delivered in digital and written report format to the government. Results also shall be presented and documented in a final report. All results shall be delivered to the government.

- 3.2 UAH shall define microelectronic component obsolescence assessment methods. UAH shall analyze current government obsolescence assessment methods. Additional approaches shall be developed as required. Analysis methods, data sources, criteria and reporting formats shall be documented within all written reports.
- 3.3 UAH shall research and analyze HELLFIRE weapon system microelectronic component availability data. Commercial and government databases shall be searched for data on microelectronic obsolescence and availability. Alternate sources, part numbers and qualified substitutes for obsolete or unavailable parts shall be identified. Compliance with military and commercial standards shall be verified. Specific alternate and substitute parts for those determined obsolete or determined to pose obsolescence potential shall be recommended.
- 3.4 UAH shall assess HELLFIRE weapon system readiness, producibility, and supportability impacts resulting from microelectronic obsolescence. Specific component availability and obsolescence problems affecting the HELLFIRE weapon system shall be identified. Quantitative statistics to demonstrate the impacts at the system, line replaceable unit (LRU), circuit board and component levels shall be derived. Potential approaches to resolve availability and obsolescence problems and reduction of their impacts on system supportability shall be proposed.
- 3.5 UAH shall identify opportunities for insertion of new microelectronic technologies into the HELLFIRE weapon system. LRUs or boards which are candidates for redesign based on their use of obsolete microelectronics shall be identified.
- 3.6 UAH shall investigate the use of the technology insertion program to resolve deficient technical data packages (TDP), eliminate sole source TDPs, and delete Reliability, Availability, and Maintainability (RAM) problems. Benefits in terms of improved performance, producibility, readiness and life cycle costs shall be demonstrated.
- 3.7 UAH shall analyze the producibility of the HELLFIRE weapon system and subsystems. The analyses shall be performed on parts specifically identified by the government. UAH shall analyze TDP data (listing, engineering documentation and changes thereto) to advise the government if the present baseline and/or detail drawings are adequate for competitive procurement and/ or manufacture. UAH shall, during TDP analysis, document any cost reduction opportunities in the TDP, using value engineering methodology as a generally accepted practice of cost analysis. UAH shall provide a written report for each TDP analyzed. The report shall detail any deficiencies and provide recommended solutions. UAH shall provide recommended TDP updates where applicable.

- 3.8 UAH shall perform an engineering analysis on producibility problems identified during the procurement cycle of HELLFIRE weapon system secondary items. The analysis shall require review of drawings, specifications, and related materials. UAH shall determine and recommend solutions to the producibility problems and provide rationale to support recommendations. UAH shall, during engineering analysis, document any cost reduction opportunities in the TDP, using value engineering methodology as a generally accepted practice of cost analysis. Results of the analysis shall be prepared and furnished in a written report.

4.0 Assessment of the HELLFIRE Weapon System

Under this task members of the UAH Systems Management and Production Lab performed a detailed engineering analysis on the component parts of the HELLFIRE weapon system. Specifically, microelectronic components were analyzed according to their availability and expected life cycle. To ascertain this information, UAH worked with the electronics industry, the HELLFIRE Project Office, and other government agencies.

The results of this task were published in the *Microcircuit Obsolescence Assessment of the HELLFIRE Weapon System* and delivered to MT under separate cover.

5.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, members of the UAH Systems Management and Production Lab, with the cooperation of representatives from AMCOM Engineering Directorate and the HELLFIRE Project Office investigated the life cycle supportability of the microelectronics of the HELLFIRE weapon system. Because of the rapidly changing microelectronics industry, it is imperative that this assessment be refreshed on a periodic basis. Only through the diligent monitoring of a complex system can its sustainability issues be properly addressed. It is recommended that the HELLFIRE Project Office adopt a proactive obsolescence management philosophy so that the total cost of ownership is reduced over the system's life cycle.